ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	HASSLACHER Holding GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HAS-20210171-IBD1-EN
Issue date	10/09/2021
Valid to	02/08/2026

Glued laminated timber, glued solid timber, block glued glulam and special components according to EN 14080

HASSLACHER Holding GmbH

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

ECO PLATFORM EPD EN 15804 VERIFIED

From wood to wonders.

HASSLACHER NORICA TIMBER
From wood to wonders.

1. General Information

HASSLACHER Holding GmbH

Glued laminated timber, glued solid timber, block glued glulam, special components

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Owner of the declaration
HASSLACHER Holding GmbH
Feistritz 1
9751 Sachsenburg
Austria

Declaration number
EPD-HAS-20210171-IBD1-EN

Declared product / declared unit
1 m³ glued laminated timber with an average density of 470 kg/m³
(Moisture at delivery = 13 %)

This declaration is based on the product category rules:
Solid wood products, 12.2018
(PCR checked and approved by the SVR)

Scope:
This document refers to average HASSLACHER glued laminated timber, glued solid timber, block glued glulam and special components manufactured at the following production sites:
- NORITEC Holzindustrie GmbH in Sachsenburg (Austria),
- HASSLACHER Holzbausysteme GmbH in Hermagor (Austria),
- HASSLACHER Holzbauteile GmbH & Co. KG in Kleinheubach (Germany) and
- NORDLAM GmbH in Magdeburg (Germany).

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.

Issue date
10/09/2021

Valid to
02/08/2026

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data according to *ISO 14025:2010*
☐ internally ☒ externally

Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Matthias Klingler
(Independent verifier)

2. Product

2.1 Product description/Product definition

Glued laminated timber (the term also includes glued solid timber, block glued glulam and special components throughout this document) from HASSLACHER Holding GmbH is a solid, rod-shaped timber element consisting of at least two dried softwood lamellas bonded parallel to the fibres. The glued laminated timber is manufactured according to *EN 14080*.

A high degree of dimensional stability and load-bearing capacity is achieved through visual or mechanical strength grading of the board lamellas and homogenisation of the visual and physical material properties.

Glued laminated timber is usually made from spruce, fir, pine or larch. The standard strength classes are GL24h, GL24c to GL32h and GL32c.

Glued laminated timber is available as standard or commissioned goods as well as in special dimensions and special constructions or in the form of special components.

Due to the existing joinery and surface finishing options integrated in the production plants, a high

degree of prefabrication and thus a shortened construction time can be achieved.

Production is subject to in-house and external monitoring in accordance with *EN 14080*.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration *ÖNORM EN 14080:2013-08-01, Timber structures – glued laminated timber and glued solid timber – Requirements* and the CE-marking.

For the application and use the respective national provisions apply.

2.2 Application

Glued laminated timber is used in all structural areas of modern timber construction, i.e. from engineering-based residential and industrial construction to bridge building. Glued laminated timber, with the exception of glued solid timber (only service classes 1 and 2), can be used in service classes 1 to 3 according to *EN 1995-1-1.*

The use of preventive chemical wood preservation according to *DIN 68800-3* is unusual and only permissible if structural wood preservation according to *DIN 68800-2* is not sufficient on its own. If, in exceptional cases, a preventive chemical wood preservative is used, this must be regulated by a general building authority approval or approval according to the Biocidal Products Regulation.

2.3 Technical Data

Structural data for glued laminated timber according to *EN 14080* are given. [2]

Structural data

Name	Value	Unit
Wood species according to EN 1912 and letter codes, if any, in accordance with EN 13556 1)	PCAB (Norway spruce) ABAL (Silver fir) PNSY (Scots pine) LADC (Europ. Larch)	
Mean humidity acc. to EN 13183-1 2)	12 ± 2	%
Use of wood preservatives (the test rating of the wood preservative according to DIN 68800-3 must be stated) 3)	Iv, P and W	-
Characteristic value of compressive strength parallel to grain acc. to EN 14080 4)	18.5 - 36	N/mm²
Characteristic value of compressive strength perpendicular to grain acc. to EN 14080 4)	2.5	N/mm²
Characteristic value of tensile strength parallel to grain acc. to EN 14080 4)	15 – 28.8	N/mm²
Characteristic value of tensile strength perpendicular to grain acc. to EN 14080 4)	0.5	N/mm²
Mean value of modulus of elasticity parallel to grain acc. to EN 14080 4)	10400 - 15750	N/mm²
Characteristic value of shear strength acc. to EN 14080 4)	3.5	N/mm²
Mean value of shear modulus acc. to EN 14080 4)	650	N/mm²
Dimensional deviations acc. to EN 14080	Width: +/- 2 mm; heights (< 400 mm): + 4 mm /- 2 mm heights (> 400 mm): 1 % /- 0,5 %; Lengths (< 2 m): +/- 2 mm; Lengths (> 2 m /< 20 m): +/- 0,1 %; Lengths (> 20 m): +/- 20 mm	mm or %
Average raw density of load-bearing elements acc. to EN 14080 4)	470	kg/m³
Surface quality	Visual quality, industrial visual quality	-
Thermal conductivity (perpendicular to grain) acc. to ISO 10456	12	W/(mK)
Specific heat capacity acc. to ISO 10456	1600	J/(kgK)
Water vapour diffusion resistance factor acc. to ISO 10456 5)	μ = 50 (dry) to 20 (wet)	-

[1] For cross laminated timber of predominantly softwood.
[2] *EN 14080* allows for different equivalent measurement methods.
[3] According to *DIN 68800-1*, wood preservative treatment is only permissible if structural measures have been exhausted and is therefore unusual.
[4] According to EN 14080, more elastomechanical properties, in particular bending strengths, can be declared. It is common to state strength classes such as GL20c, GL28c or GL36h. The ranges given here refer to average or characteristic values of the strength classes mentioned. The declared density values may deviate from these average values due to different densities of the wood species used.
[5] The water vapour diffusion equivalent air layer thickness is determined from the product of the layer thickness with the water vapour diffusion resistance number.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *ÖNORM EN 14080:2013-08-01, Timber structures – glued laminated timber and glued solid timber – Requirement*s (not part of CE-marking).

2.4 Delivery status

Glued laminated timber is produced and supplied in the following dimensions:
Min. height: 80 mm
Max. height: 4000 mm
Min. width: 80 mm
Max. width: 1200 mm (can be extended for custom parts)
Max. length: 27 m (42 m for custom parts)

2.5 Base materials/Ancillary materials

Glued laminated timber is made from fibre-parallel, technically dried planks or squared timber made of softwood bonded after having been visually or mechanically strength-graded.
Melamine-urea-formaldehyde adhesives (MUF) and, in smaller quantities, polyurethane adhesives (PUR), emulsion-polymer-isocyanate adhesives (EPI) and phenol-resorcinol-formaldehyde adhesives (PRF) are used for the generally thermoset bonding.
The release of formaldehyde is declared according to *EN 14080*.

The averaged proportions of ingredients per m³ of glued laminated timber for the environmental product declaration are:
- Softwood, predominantly spruce, approx. 88.5-89.5 %
- Water approx. 9-10 %
- MUF adhesives approx. 1.5 %
- PUR adhesives < 0.1 %
- EPI adhesives < 0.1 %
- PRF adhesives < 0.1 %

The product has an average density of 470 kg/m³ (average across all strength classes and wood species).

This product/article/at least one partial article contains substances listed in the candidate list (19.01.2021) exceeding 0.1 percentage by mass: no.

This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no.

2.6 Manufacture

For the production of glued laminated timber, conventional sawn timber is first dried to below 15 % wood moisture (target moisture content: approx. 12 ± 2 %), pre-planed and graded visually, but mainly by machine, according to strength. Board sections with strength-reducing or visually inappropriate areas are cut out depending on the required or desired strength classes or quality demands and the resulting boards are joined by finger joints to form endless lamellas. In the subsequent pre-planing process, the board lamellas are planed to the desired final thickness of > 6 to < 45 mm (from > 45 to < 85 mm in the case of glued solid timber), in order to be able to be bonded after the adhesive has been applied to the broadside.

After the adhesive has been applied to the broadside, they are pressed in a straight or curved press bed to form at least two-layer glulam blanks. After curing, the blank is planed, chamfered, tied and packed. If required, a treatment with surface finishes (end-grain protection, UV protection, glazes, assembly and hydrophobic protection, etc.) can be carried out before packaging.

2.7 Environment and health during manufacturing

Accruing exhaust air is purified in accordance with legal requirements. No pollution of water and soil takes place. The resulting waste water is fed into the local sewage system.

2.8 Product processing/Installation

Glued laminated timber can be processed with suitable tools commonly used in solid timber processing. On request, the products can also be processed in the factory and provided with fasteners or (glued-in) steel parts.
Occupational safety instructions must also be observed during processing/assembly.

2.9 Packaging

Polyethylene, solid timber, paper and cardboard as well as small amounts of other plastics are used.

2.10 Condition of use

The composition for the period of use corresponds to the basic material composition according to section 2.5 "Base materials/Ancillary materials".
During use, about 200 kg of carbon are bound within the product. This corresponds to about 750 kg CO_2 in the case of complete oxidation.

2.11 Environment and health during use

Environmental protection: According to the current state of knowledge, hazards to water, air and soil cannot arise if the products are used as intended.

Health protection: According to the current state of knowledge, no health hazards or impairments are to be expected.
With regard to formaldehyde, glued laminated timber is low in emissions due to its low adhesive content, its structure and its form of use (formaldehyde emission class E1).
Glued laminated timber bonded using MUF adhesives subsequently releases formaldehyde; with regard to the limit value of < 0.1 ppm HCOO/m² air of formaldehyde emission class E1, the measured test values of < 0.01 ppm HCHO/m³ air can be categorised as low and are at the detectability limit of state-of-the-art measurement methods. MUF adhesives themselves do not contain MDI.

2.12 Reference service life

Glued laminated timber has been used for over 100 years.
When used as intended, no end to its durability is known or to be expected.
The service life of glued laminated timber is therefore the same as the service life of the building when used as intended.

2.13 Extraordinary effects

Fire

Fire performance acc. to *EN 13501-1*

- Fire classification D – normal flammable
- Smoke class s2 – normal smoke production
- Flaming droplets d0 – no dripping
- The toxicity of the fire gases corresponds to that of natural wood.

Fire resistance
The burn rate of glued laminated timber is:

- 0.70 mm/min when used as girder or support,
- 0.65 mm/min when used as ceiling.
- d0 = 7 mm, d0 … Zero-strength layer

Water
No ingredients are washed out that may be hazardous to water.

Mechanical destruction
Solid wood lamellas are used for the production of glued laminated timber. The break pattern of glued laminated timber therefore also has an appearance typical of solid wood.

2.14 Re-use phase
In the case of selective deconstruction, glued laminated timber can be re-used or re-utilised without any problems after the end of the utilisation phase in the sense of cascading utilisation ("re-use") due to its monolithic layout.
If it is not possible to reuse or re-utilise structural finger jointed solid timber, it can be thermally recycled to generate process heat and electricity due to its high calorific value of approx. 19 MJ/kg.

2.15 Disposal
It is impermissible to dispose of waste wood via landfills.

Waste classification: Classification code 17218 (Wood waste, organically treated) according to the Waste Catalogue in accordance with Annex 5 of the Austrian *Waste Catalogue Ordinance;* Waste Code according to the European Waste Catalogue (EWC): 17 02 01.

2.16 Further information
You can find further information at www.hasslacher.com

3. LCA: Calculation rules

3.1 Declared Unit
This EPD refers to a declared unit of 1 m^3 of HASSLACHER glued laminated timber with an average density of 470 kg/m^3 at 13 % moisture at delivery.

Declared unit

Name	Value	Unit
Declared unit	1	m^3
Gross density	470	kg/m^3
Wood moisture at delivery	13	%
Conversion factor to 1 kg [Mass/Declared Unit]	470	-

HASSLACHER glued laminated timber is manufactured at following production sites of the HASSLACHER group:
Sachsenburg (Austria), Hermagor (Austria), Magdeburg (Germany) and Kleinheubach (Germany).

The declared unit was calculated on a volume-weighted basis. This EPD refers to an average product produced at four production sites of the HASSLACHER group and is valid for 100 % of the produced quantities. All products undergo the same processing steps. A variation in the results of ± 30 % is given when comparing the environmental impacts of the average weighted sites (exceptions: Freshwater Eutrophication: -40 % to +50 %; Water scarcity: -30 % to +80 %; Ozone depletion: very high uncertainty).
A possible variability is also expected due to the use of different wood species. The upstream chain for spruce is considered as representative. The robustness of the declared LCA values can thus be classified as high.

3.2 System boundary
The life cycle assessment of HASSLACHER glued laminated timber refers to a cradle-to-gate analysis of the environmental impacts with modules C1-C4 and D (A1-A3, +C, +D). The following life cycle phases are taken into consideration in the analysis:

Module A1-A3 | Production stage
The production stage includes the upstream burdens of raw material supply (sawn timber, production of the adhesive system, etc.) and their transports to the manufacturing plants in Sachsenburg, Hermagor, Kleinheubach and Magdeburg. Sorting, planing, finger-jointing, pressing, and joining, including the packaging of the product, are taken into account. The electricity demand of the Austrian production sites in Sachsenburg and Hermagor are covered entirely by green electricity (emission factor GWP-total: 13 g CO_2 equivalent/kWh). Thermal energy is provided from the energetic use of wooden residues from the production process. In Magdeburg, thermal energy is delivered by the adjacent waste incineration plant. Emissions of the waste recovery process are attributed to the product system from which the waste originates. As a result, thermal energy is considered burdenfree in the calculation.

Module C1 | Deconstruction and demolition
After the removal of building components overlying the product, the joints can simply be loosened by screwing or sawing and lifted by cranes to the place of removal. Required energy demand can be neglected. The actual energy demand depends on the installation of the products and can therefore vary greatly in the building context.

Module C2 | Transport to disposal
Module C2 includes the transport to waste treatment. In this case, transport by truck over a transport distance of 50 km is assumed.

Module C3 | Waste processing
In Module C3, the chipping after removal of the products is considered. The wooden products and with them the material-inherent properties leave the product system as secondary fuel in module C3.

Module C4 | Disposal
The applied scenario declares the energetic recovery of the wooden products; therefore, no environmental impacts are to be expected from waste processing of the products in C4.

Module D | Benefits and loads beyond the system boundary
Applying an European average scenario, module D describes the energetic recovery of the product at the end-of-life including the corresponding energy substitution potentials.

3.3 Estimates and assumptions
Assumptions and approximations are applied in case of a lack of representative data. All assumptions and approximations are documented precisely and represent a best-guess representation of reality.

A large part of the wood processed by HASSLACHER represents softwood. A generic data set from the *GaBi* database for spruce round timber was used as background data set. For other wood species used, the data set for spruce is regarded as an approximation.

Emissions from wood drying were included in the calculations according to *Rüter & Diederichs* (2012).

3.4 Cut-off criteria
The LCA model covers all available input and output flows, which can be represented based on robust data and from which a significant contribution can be expected. Data gaps are filled with conservative assumptions of average data or generic data if available and are documented accordingly.
Only data with a contribution of less than 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cut-off material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows.

3.5 Background data
This study uses generic background data for the evaluation of upstream environmental impacts from *GaBi* database 2021.1 as well as recognised literature such as *Rüter & Diederichs* 2012.

3.6 Data quality
Data collection is based on industry-specific questionnaires. It follows an iterative process clarifying questions via e-mail, telephones calls or in personal and online meetings, respectively.
Intensive discussions between HASSLACHER and Daxner & Merl result in an accurate mapping of product-related material and energy flows. This leads to a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044*.

The technological, geographical, and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *GaBi* background datasets refer to the latest versions available (not more than ten years old) and are carefully chosen.

3.7 Period under review
Foreground data were collected in the 2019 production year, and the data are based on the volumes produced on an annual basis.

3.8 Allocation
Carbon content and primary energy content of the products were assessed based on their material-inherent properties according to underlying physical relationships. The allocation in the upstream supply chain of wooden products is based on the publication by *Hasch 2002* and its update by *Rüter & Albrecht 2007*.

During the production co-products such as off-cuts, chips, cross-cutting and planing losses are produced in addition to the declared product. Co-products are allocated based on their market price in accordance with the recommendations of *EN 16485*.

Thermal energy for the production site in Magdeburg is provided by the adjacent waste incineration plant. Emissions of the waste recovery process are attributed to the product system from which the waste originates. As a result, thermal energy is included burdenfree in the calculation. The end of waste status is not reached before waste incineration.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The *GaBi* background database was used to calculate the LCA (*GaBi* 10; 2021.1).

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon
During tree growth, the wood assimilates carbon dioxide and stores biogenic carbon. The carbon stored in the product is declared in the following table.

Information on the biogenic carbon content at the gate

Name	Value	Unit
Biogenic Carbon Content in product	204	kg C

As the packaging amounts to far less than 5 % of the product mass, the biogenic carbon stored in the packaging does not have to be declared in the EPD.

End of life (C1-C4)

Name	Value	Unit
Energy recovery	470	kg

Reuse, recovery, and recycling potential (D), relevant scenario information

Name	Value	Unit
Processing rate	100	%
Efficiency of the plant	61	%

The product reaches the end of its waste status after removal from the building, transport to processing and chipping of the product. For the end of life of the HASSLACHER solid wood products, energy recovery as secondary fuel in a biomass power plant is assumed. As the main sales market for HASSLACHER products is concentrated in the European region, plant-specific characteristic values correspond to a European average scenario (EU28). The scenario considers a reprocessing rate of 100 % for the solid wood products after removal from the building. This assumption has to be adjusted accordingly when applying the results in the building context. At the end-of-life of the product, the equilibrium moisture is comparable to the moisture content at delivery. This value can vary depending on the storage of the product before energy recovery.

5. LCA: Results

The following table contains the life cycle assessment results for a declared unit of 1 m³ HASSLACHER glued laminated timber with an average density of 470 kg/m³ (approx. 13 % moisture content).

Disclaimer:
EP-freshwater: This indicator has been calculated as “kg P eq” as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ glued laminated timber (470 kg/m³)

Core Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global warming potential - total	[kg CO_2-Eq.]	-6.08E+2	0.00E+0	1.42E+0	7.53E+2	0.00E+0	-4.10E+2
Global warming potential - fossil fuels	[kg CO_2-Eq.]	1.44E+2	0.00E+0	1.41E+0	3.74E+0	0.00E+0	-4.08E+2
Global warming potential - biogenic	[kg CO_2-Eq.]	-7.53E+2	0.00E+0	-1.67E-3	7.50E+2	0.00E+0	-1.42E+0
GWP from land use and land use change	[kg CO_2-Eq.]	7.81E-1	0.00E+0	1.15E-2	5.29E-3	0.00E+0	-3.19E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	6.84E-8	0.00E+0	2.77E-16	8.95E-14	0.00E+0	-5.32E-12
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	6.67E-1	0.00E+0	4.66E-3	7.78E-3	0.00E+0	3.05E-1
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg PO_4-Eq.]	1.64E-3	0.00E+0	4.17E-6	1.00E-5	0.00E+0	-6.05E-4
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	2.95E-1	0.00E+0	2.14E-3	1.85E-3	0.00E+0	5.77E-2
Eutrophication, accumulated exceedance	[mol N-Eq.]	3.01E+0	0.00E+0	2.39E-2	1.94E-2	0.00E+0	6.98E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	8.47E-1	0.00E+0	4.20E-3	5.01E-3	0.00E+0	2.62E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	3.81E-5	0.00E+0	1.25E-7	1.10E-6	0.00E+0	-7.47E-5
Abiotic depletion potential for fossil resources	[MJ]	2.09E+3	0.00E+0	1.87E+1	6.65E+1	0.00E+0	-7.17E+3
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m³ world-Eq deprived]	1.17E+1	0.00E+0	1.30E-2	6.00E-1	0.00E+0	-1.05E+1

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ glued laminated timber (470 kg/m³)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	1.70E+3	0.00E+0	1.08E+0	7.68E+3	0.00E+0	-1.83E+3
Renewable primary energy resources as material utilization	[MJ]	7.66E+3	0.00E+0	0.00E+0	-7.65E+3	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	9.36E+3	0.00E+0	1.08E+0	3.06E+1	0.00E+0	-1.83E+3
Non-renewable primary energy as energy carrier	[MJ]	2.00E+3	0.00E+0	1.88E+1	6.65E+1	0.00E+0	-7.17E+3
Non-renewable primary energy as material utilization	[MJ]	8.51E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.09E+3	0.00E+0	1.88E+1	6.65E+1	0.00E+0	-7.17E+3
Use of secondary material	[kg]	3.02E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.65E+3
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m³]	8.04E-1	0.00E+0	1.23E-3	2.98E-2	0.00E+0	-1.20E+0

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ glued laminated timber (470 kg/m³)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	[kg]	1.98E-6	0.00E+0	9.90E-10	1.76E-8	0.00E+0	-1.61E-6
Non-hazardous waste disposed	[kg]	1.99E+0	0.00E+0	2.95E-3	4.72E-2	0.00E+0	2.72E-1
Radioactive waste disposed	[kg]	7.30E-2	0.00E+0	3.41E-5	9.90E-3	0.00E+0	-5.89E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	4.70E+2	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m³ glued laminated timber (470 kg/m³)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND	ND

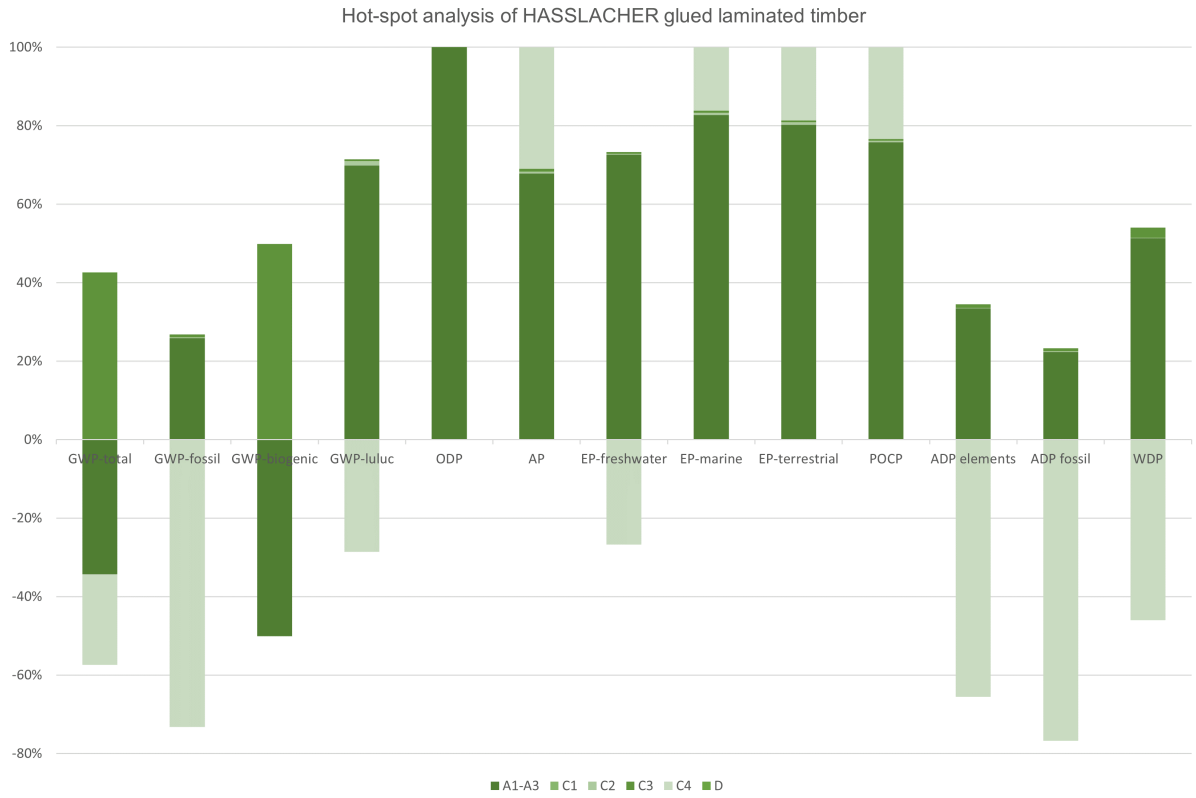
The additional and optional impact categories according to *EN 15804+A2* are not declared, as this is not required according to *PCR Part A*.

Disclaimer 1 – for the indicator “potential Human exposure efficiency relative to U235“:
This impact category deals mainly with the eventual impact of low dose ionizingradiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators: “abiotic depletion potential for fossil resources”, “abiotic depletion potential for non-fossil resources”, “water (user) deprivation potential”, “deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans - cancer effects”, “potential comparative toxic unit for humans – non-cancer effects”, “potential soil quality index”:
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results related to a declared unit of 1 m³ of average HASSLACHER glued laminated timber.



Global warming potential (GWP) shows a negative value in the production phase (modules A1-A3) of the glued laminated timber products. This is due to the material use of wood in the production and the sequestration of biogenic carbon in wood. Trees use carbon dioxide from the atmosphere in order to grow and thus bind carbon in their biomass (negative GWP).

During the energetic treatment in a combined heat and power plant at the End-of-Life (module C3) the bound biogenic carbon is released to the atmosphere as carbon dioxide and thus contributes to potential global warming.

The negative values in module D can be explained by the fact that the energy generated by the energetic

utilization of the product can replace the combustion of fossil energy sources. Thus, more emissions of (mainlyfossil) energy sources are avoided than are emitted by using the energy stored in the wood. Environmental burdens (AP, EP, POCP) in module D are mainly caused by emissions from the combustion of biomass.

The interpretation of the results identifies the impacts from the upstream supply chain of sawn timber as the main driver in the environmental profile of glued laminated timber. The environmental impacts from forestry play an important role as well as the energy supply for wood drying processes.
In addition to the wood supply chain, the provision of electricity and transport to the sites represent hot-spots in the environmental profile of the products.

Potential contribution to tropospheric ozone photochemical oxidants (POCP) are mainly driven by direct emissions of the wood drying processes at the production site in Magdeburg as well as by adhesive application. Due to high data uncertainties, the validity of the results is limited.

7. Requisite evidence

7.1 Formaldehyde

Testing entity
Holzforschung Austria – Österreichische Gesellschaft für Holzforschung

Place of test
Franz-Grill-Straße 7, A-1030 Vienna

Test report and test period
Test report no. 1096/2021- HC
Test period 06.04.2021 to 18.05.2021

Test method and result
Measurement of the emissions of a sample with respect to VOC, formaldehyde and short-chain carbonyl compounds according to *EN 16516*.

Test result
See tables regarding results overview in 7.4.

7.2 MDI

When bonding glued laminated timber, the MDI contained in the PUR and EPI adhesives (e.g. used for finger joint bonding) used reacts out completely, making the detection of MDI emissions in the cured glued laminated timber impossible.

7.3 Toxicity of fire gases

The toxicity of the fire gases produced by burning cross laminated timber corresponds to those produced by burning untreated wood.

7.4 VOC-emissions

Testing entity
Holzforschung Austria – Österreichische Gesellschaft für Holzforschung

Place of test
Franz-Grill-Straße 7, A-1030 Vienna

Test report and test period
Test report no. 1096/2021- HC
Test period 06.04.2021 to 18.05.2021

Test method and result
Measurement of the emissions of a sample with respect to VOC, formaldehyde and short-chain carbonyl compounds according to *EN 16516*.

Results overview (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16) (substance spec.)	184	µg/m³
TVOC (Toluene equiv.)	160	µg/m³
R (dimensionless)	0.14	-
Formaldehyde	4.4	µg/m³

Results overview (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16) (substance spec.)	181	µg/m³
TVOC (Toluene equiv.)	170	µg/m³
Formaldehyde	7.3	µg/m³

8. References

Standards

DIN 68800-1
DIN 68800-1:2019-06, Wood preservation – Part 1: General.

DIN 68800-2
DIN 68800-2:2012-02, Wood preservation – Part 2: Preventive constructional measures in buildings.

DIN 68800-3
DIN 68800-3:2020-03, Wood preservation – Part 3: Preventive protection of wood with wood preservatives.

EN 717-1
ÖNORM EN 717-1:2005-02-01, Wood-based panels – Determination of formaldehyde release – Part 1: Formaldehyde emission by the chamber method.

EN 1912
ÖNORM EN 1912:2013-10-15, Structural timber – Strength classes – Assignment of visual grades and species.

EN 13183-1
ÖNORM EN 13183-1:2004-02-01, Moisture content of a piece of sawn timber - Part 1: Determination by oven dry method.

EN 13501-1
ÖNORM EN 13501-1:2020-01-15, Fire classification of construction products and building elements - Part 1:

Classification using data from reaction to fire tests.

EN 13556
OENORM EN 13556:2003-09-01, Round and sawn timber. Nomenclature of timbers used in Europe.

EN 14080
ÖNORM EN 14080:2013-08-01, Timber structures – glued laminated timber and glued solid timber – Requirements.

EN 15804
ÖNORM EN 15804+A2:2020-02-15, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

EN 16485
OENORM EN 16485:2014-05-01, Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction.

EN 16516
DIN EN 16516:2020-10, Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air.

EN 1995-1-1
ÖNORM EN 1995-1-1:2019-06-01, Eurocode 5: Design of timber structures - Part 1-1: General – Common rules and rules for buildings.

ISO 10456
ÖNORM EN ISO 10456:2010-02-15, Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values.

ISO 14025
ÖNORM EN ISO 14025:2010-07-01, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

ISO 14044
DIN EN ISO 14044:2006-10. Environmental management – Life cycle assessment – Requirements and guidelines.

Further References

AgBB
German Committee for Health-Related Evaluation of Building Products (AgBB): Approach to health assessment of emissions of volatile organic compounds (VOCs and SVOCs) from building products.

Biocidal Products Regulation
Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

CPR
Regulation (EU) No. 305/2011 of the European Parliament and the Council of 9 March 2012 laying down harmonised conditions for the marketing of the construction products and on repealing Directive 89/106/EEC of the Council.

EWC
EWC European Waste Catalogue – EWC, Ordinance on the European Waste Catalogue (Waste Catalogue Ordinance) Waste Catalogue Ordinance of 10 December 2001 (BGBl. I S. 3379), last amended by Article 5 para. 22 of the law dated 24. February 2012 (BGBl. I S. 212).

ECHA Candidate List
List of substances of very high concern considered for approval (status 19.01.2021) according to Article 59 para. 10 of the REACH Regulation. European Chemicals Agency.

GaBi
GaBi 10, Software-System and Database for Life Cycle Engineering. DB v8.7 2020.2. Stuttgart, Echterdingen: Sphera, 1992-2020. Available at: http://documentation.gabi-software.com.

Hasch 2002, Rüter & Albrecht 2007
Ökologische Betrachtung von Holzspan und Holzfaserplatten, Diss., University of Hamburg, amended in 2007: Rüter, S. (BFH HAMBURG; Timber Technology), Albrecht, S. (University of Stuttgart, GaBi).

Holzforschung Austria
Holz Forschung Austria, VOC Emissions Test Report according to EN 16516 (18.05.2021), Number: 1096/021 - HC.

IBU 2021
Institut Bauen und Umwelt e.V.: Allgemeine Anleitung für das EPD-Programm des Institut Bauen und Umwelt e.V. (IBU). Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.
www.ibu-epd.com

PCR part A
Product category rules for building-related products and services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019. Version 1.1. Berlin: Institut Bauen und Umwelt e.V., 2021.

PCR: Solid wood products
Product category rules for building-related products and services. Part B: EPD requirements for solid wood products. Version 1.1. Berlin: Institut Bauen und Umwelt e.V., 10.12.2018.

Rüter & Diederichs 2012
Ökobilanz-Basisdaten für Bauprodukte aus Holz. Arbeitsbericht aus dem Institut für Holztechnologie und Holzbiologie Nr. 2012/1. Hamburg: Johann Heinrichvon Thünen-Institut.

Waste Catalogue Ordinance
Waste Catalogue according to Annex 5 of the Austrian Waste Catalogue Ordinance. Order of the Federal Minister for Sustainability and Tourism on a Waste Catalogue (Waste Catalogue Ordinance 2020).

Publisher
Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

Programme holder
Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

Author of the Life Cycle Assessment
Daxner & Merl GmbH
Lindengasse 39/8
1070 Wien
Austria

Tel +43 676 849477826
Fax +43 42652904
Mail office@daxner-merl.com
Web **www.daxner-merl.com**

Owner of the Declaration
HASSLACHER Holding GmbH
Feistritz 1
9751 Sachsenburg
Austria

Tel 0043 4769 22 49 0
Fax 0043 4769 22 49 129
Mail info@hasslacher.com
Web **www.hasslacher.com**